

Antimony-Based Focal Plane Arrays for Shortwave-Infrared to Visible Applications, Phase II Project

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ABSTRACT

We propose to develop antimony-based focal plane arrays (FPAs) for NASA's imaging and spectroscopy applications in the spectral band from visible to shortwave-infrared (SWIR), viz. wavelengths from 0.5 - 2.5 microns. We will leverage recent breakthroughs in the performance of midwave and longwave infrared FPAs based on the InAs/GaSb/AlSb material system in which QmagiQ has played a key part. In these spectral bands, this novel sensor already offers performance comparable to mercury cadmium telluride (MCT) but at a fraction of the cost due to the leveraging of commercial growth and process equipment. Our goal is to extend that benefit into the shortwave infrared. Using the best material currently available and a novel bandgap-engineering design and process, we will fabricate FPAs and measure how the antimony-based sensor compares to state-of-the-art shortwave MCT in terms of quantum efficiency and dark current. In Phase I, we developed the basic building block - a high-performance SWIR photodiode. In Phase II, we will develop FPAs in a variety of formats and deliver them to NASA for evaluation for its astronomy and planetary missions.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: 1) Space- and ground-based astronomy and astrophysics 2) NASA's earth-observing missions in the visible and shortwave-infrared 3) Chemical/spectral mapping of forests, vegetation and crops 4) Atmospheric mapping 5) Pollution monitoring 6) Temperature mapping of oceans and landmasses

To the commercial space industry:

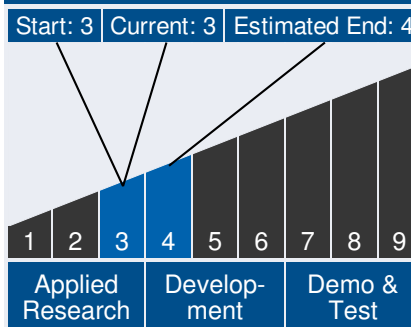
Potential Non-NASA Commercial Applications: 1) Hyperspectral imaging systems for inspection of agricultural produce and pharmaceutical drugs 2) FTIR imaging microscopy 3) Gas imaging (e.g. for the petrochemical industry) 4) Security and surveillance (day and night) 5) Thermography 6) Medical



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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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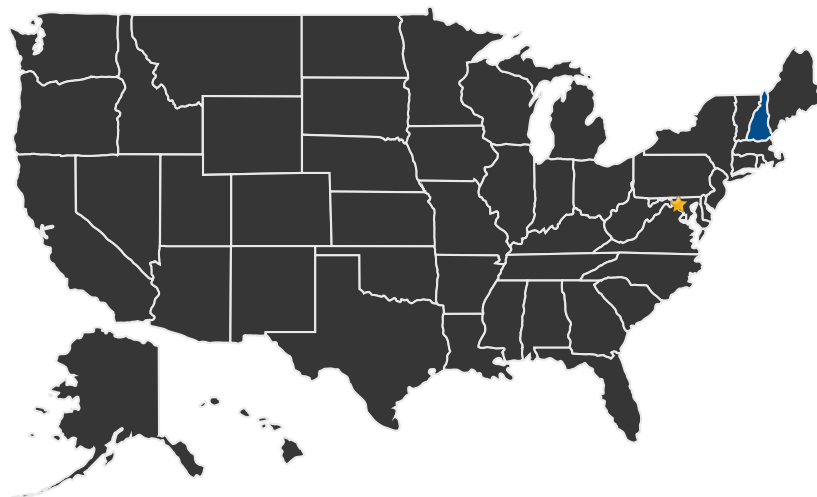
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imaging 7) Missile defense 8) Space-based situational awareness

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Goddard Space Flight Center

Other Organizations Performing Work:

- QmagiQ (Nashua, NH)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23607>)

Management Team *(cont.)*

Principal Investigator:

- Mani Sundaram

Technology Areas

Primary Technology Area:

Science Instruments,
Observatories, and Sensor
Systems (TA 8)

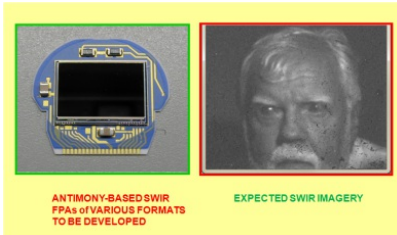
- └ In-Situ Instruments and
Sensors (TA 8.3)

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IMAGE GALLERY



*Antimony-Based Focal Plane Arrays for
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Applications, Phase II*

DETAILS FOR TECHNOLOGY 1

Technology Title

Antimony-Based Focal Plane Arrays for Shortwave-Infrared to Visible Applications, Phase II

Potential Applications

1) Space- and ground-based astronomy and astrophysics 2) NASA's earth-observing missions in the visible and shortwave-infrared 3) Chemical/spectral mapping of forests, vegetation and crops 4) Atmospheric mapping 5) Pollution monitoring 6) Temperature mapping of oceans and landmasses